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CASE STUDY · MARLUC SYNOPSIS

AI-discovered drugs: clinical trial success rates (Jayatunga et al.)

IMPLEMENTED 2015–2026 · HEALTH AND LIFE SCIENCES · GLOBAL · BAND C · PARTLY PROVED

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A 2024 peer-reviewed analysis by Boston Consulting Group authors found 80 to 90 per cent Phase I success for AI-discovered molecules and about 40 per cent in Phase II, close to historic averages. A 2026 independent analysis found a lower Phase II rate of 19.5 per cent.

ABOUT THIS SYNOPSIS

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Facts and figures are as reported by the sources listed below, which may be incomplete, self-reported or out of date. Check the original source before relying on any figure.

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NOTICE WORDING LAST UPDATED 16 NOVEMBER 2026

AT A GLANCE

Frontier case: AI used for a scientific, medical or engineering breakthrough. The transformation is potential and unproven; MarLuc grades what has changed in practice so far.

AI used: AI-discovered drug candidates from AI-native biotech companies; how each molecule was discovered varies and is not set out in the sources read.

Implemented: 2015–2026. Grade: band C, Process change, Partly proved.

Headline result, as reported: AI-discovered molecules did better than historic averages in Phase I; Phase II results were close to historic averages in 2024 and lower in a 2026 independent analysis

1 · The case

The facts, as reported by the 4 sources listed at the end. Where a source is silent, the field says "Not reported".

Organisation

Drug Discovery Today analysis of AI-native biotech clinical pipelines, by Boston Consulting Group authors, with later analyses. A field-level analysis rather than a single company: the clinical pipelines of AI-native biotech companies, studied by Boston Consulting Group authors in the UK, the Netherlands and the US. Canvas block: 6. Data and technology. Also 4. Operations and process.

Business challenge

The challenge. Pharmaceutical companies had announced AI activities and partnered with AI-native biotechs, but questions remained about whether AI-discovered molecules did better in clinical trials.

How it was addressed. The authors analysed the clinical pipelines of AI-native biotech companies, counted molecules entering trials since 2015 and compared Phase I and Phase II outcomes with historic industry averages. Oliver Wyman repeated a version of the exercise in 2026, and a separate 2026 cross-sectional study counted 129 AI-enabled assets. [1] [2] [3] [4]

Who implemented it

Boston Consulting Group (Consultancy): Authors of the 2024 analysis.
Oliver Wyman (Consultancy): Authors of the 2026 update.
The AI-native biotech companies whose molecules were counted are not named in the sources read.

Technology (SEAM pillar E)

SEAM types: not established; the sources do not say how the system works. Deployment: Not reported. Vendors and products: Not reported.

Where it was built in: AI is used at the discovery stage by AI-native biotech companies; the sources read do not say how each molecule was found.

What changed

Before: no analysis of how AI-discovered molecules fared across trial phases. After: a first Phase I result above historic averages and Phase II results near them, with later data giving different Phase II figures. [1] [2] [3] [4]

What it cost

Cost of the analyses: Not reported. Oliver Wyman reports that investment in AI and machine-learning drug discovery and licensing partnerships grew from $12 billion in 2024 to $43 billion in 2025.

What it saved

Not reported. The 2024 paper states that its Phase I figure suggests AI is capable of designing or identifying molecules with drug-like properties. [1] [2] [3] [4]

Governance and control

Peer review applies to the 2024 paper and the 2026 independent analysis. The 2024 authors are employed by Boston Consulting Group. The 2026 independent paper declares no competing interests. Ethical or regulatory controls on individual trials sit with each sponsor and are not covered here.

S2 · Accountable owner · Not reported
Not reported; the analysis covers many companies' pipelines.

A1 · Safe use · Not reported
Not reported.

A2 · Human in the loop · Not reported
Not reported.

A3 · Monitoring and assurance · Outside scrutiny (a regulator, court, auditor or similar body acted)
The 2024 and 2026 independent papers are peer reviewed; the 2026 paper's authors declare no competing interests. [1] [4]

A4 · Vendor AI · Not reported
Not reported.

A5 · Agent controls · Not reported
No agents described.

A6 · Standards and regulation · Not reported
Not reported; the analysis does not cover regulators' decisions on individual drugs.

What worked, what did not, what is unproven

WORKED

– Phase I: 21 of 24 completing molecules succeeded by December 2023 (80 to 90 per cent as the authors report it), above historic averages of about 40 to 65 per cent.

– A 2026 independent count found 77.8 per cent Phase 1 success, in line with the 2024 result.

– Oliver Wyman's 2026 update reports Phase I and Phase II progression above BIO benchmarks (76 versus 52 per cent and 45 versus 29 per cent).

DID NOT

– Phase II success was about 40 per cent in 2024, comparable to historic averages.

– A 2026 independent analysis found 19.5 per cent Phase 2 success from 24 completed programmes.

– Per the 2024 paper, Phase I failures often reflected business decisions rather than technical shortcomings, so the rates mix technical and non-technical outcomes.

UNPROVEN

– Whether higher Phase I success leads to more approved drugs: only five assets had entered or completed Phase 3 by March 2026, per the independent analysis.

– Whether the 2024 result holds outside AI-native biotechs: the study looked only at molecules from those companies.

– Whether Phase II success differs from historic averages: samples are small and the sources disagree.

Timeline

2015 Start of the period in which 75 AI-discovered molecules entered clinical trials, up to December 2023 [2]

Dec 2023 Data cut-off: 24 molecules had completed Phase I, 21 successfully; 10 had concluded Phase II, 4 successfully [2]

Jun 2024 Jayatunga and colleagues publish their analysis in Drug Discovery Today [1]

Mar 2026 Data cut-off of an independent cross-sectional analysis of 129 AI-enabled assets [4]

Jun 2026 Data date of the Oliver Wyman update covering 118 Phase I and 46 Phase II programmes [3]

Oct 2026 The independent analysis is published in Cancer Treatment Reviews [4]

2 · Grade and SEAM assessment

MarLuc's opinion, made on the evidence above. How cases are graded: marluc.co.uk/case-studies/how-we-rate

Level of change and impact

Claimed: A. Grade: C, Process change. Proof: Partly proved. Level of change: Process change.

Process change (Level 2, band C) at AI-native biotechs. A transformation of drug development is claimed or hoped for by the field; the evidence so far is Phase I success rates and a small Phase II sample.

AI-native biotechs build their discovery process around AI platforms, so the change is a redesigned process at those firms, and it shows in early trial results: Phase I success above historic averages. It is not graded higher because AI-discovered molecules were about 1 to 2 per cent of the clinical pipeline in a 2026 analysis, Phase II rates were comparable to or below historic averages, and no full approval is established in the sources read. The field and some sources describe a potential transformation of drug development; that is potential and unproven. A 2026 independent count of 129 assets found only five had entered or completed Phase 3.

The SEAM view and lessons learnt

The evidence supports a narrow claim: AI-discovered molecules clear early safety and drug-likeness hurdles often. It does not yet show that they are more effective in patients. Counting rules matter: success by progression, by completion, or by completed programmes give different numbers. For a mid-sized or larger organisation, the transferable point is to ask which stage a reported success rate covers, how many programmes sit behind it, and who produced the count.

1. Ask which trial phase a success rate covers and how many programmes sit behind it.
2. Prefer independent counts over those from firms that sell AI work.
3. Track downstream results, not only early-stage speed.

Evidence

Score 2 of 4. Mixed: a peer-reviewed review article by consultancy authors, a consultancy update, and an independent peer-reviewed analysis. The full text of the 2024 paper was not available to MarLuc; its abstract was read and the figures are taken from a trade-press summary of it.

Evaluation method. Peer-reviewed pipeline analysis (2024) and cross-sectional counts (2026) based on public data; not a trial. Phase II samples are small.

Sources disagree. Phase II success is about 40 per cent (4 of 10, 2024 paper), 45 per cent by progression (Oliver Wyman, June 2026) and 19.5 per cent (independent analysis of 24 completed programmes, March 2026). Phase I is 80 to 90 per cent (2024), 74 per cent by progression (Oliver

3 · Original sources

Read these in full. To challenge a fact or a grade, use the contact form at marluc.co.uk or the link on https://marluc.co.uk/case-studies/ai-discovered-drugs-trial-success-rates

[1] NCBI PubMed record (Drug Discovery Today, 2024): How successful are AI-discovered drugs in clinical trials? A first analysis and emerging lessons
https://eutils.ncbi.nlm.nih.gov/entrez/eutils/efetch.fcgi?db=pubmed&id=38692505&retmode=xml

[2] HealthManagement.org: Clinical potential of AI in drug discovery and development (summary of the 2024 paper)
https://healthmanagement.org/c/it/News/clinical-potential-of-ai-in-drug-discovery-and-development

[3] Oliver Wyman: Biopharma's AI investment brings results and new challenges (October 2026)
https://www.oliverwyman.com/our-expertise/perspectives/health/2026/oct/biopharma-ai-drug-development-challenges.html

[4] NCBI PubMed record (Cancer Treatment Reviews, 2026): Artificial intelligence-enabled drug discovery: a growing but largely early-stage clinical pipeline
https://eutils.ncbi.nlm.nih.gov/entrez/eutils/efetch.fcgi?db=pubmed&id=42874241&retmode=xml

Drug Discovery Today analysis of AI-native biotech clinical pipelines, by Boston Consulting Group authors, with later analyses website: https://www.sciencedirect.com/journal/drug-discovery-today

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